Table of contents:

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## 1    EVK features

- USB connectivity to PCs/ laptops
- Up to 2000Hz sampling rate supported
- Temperature measurements supported
- Service mode access
    - Full gyro module information
    - Full gyro module configuration capability
    - Detailed gyro module diagnostics
    - Help section
- Measure panel
    - Data presentations and save data to file capability
    - Custom scale and zoom functions
    - CRC check
- Logging panel
    - Support for any measurement duration, only limited by hard drive, available memory and processor capacity of PC
    - Various stop criteria for measurements available ('Manually', 'No of samples' or 'Time elapsed')
- Measurements of 2 gyro modules simultaneously supported (requires additional cables depending on the type of evaluation kit)

**USB-kit – important notice!**
The USB kit supports certain distinct bit rates only. The following bit rates have been tested and verified:

| Approved bit rates w/USB kit |
| --- |
| 3 000 000 bps |
| 2 000 000 bps |
| 1 500 000bps |
| 1 411 765 bps |
| Most settings below 1 300 000 bps |

## 1.1 General descriptions

The evaluation kit provides measurement and configuration access to STIM210 and STIM300 gyro modules. Configuration, graphical result presentation and save data to file functions are supported. The single voltage supply required for the gyro module operation is provided from an USB port.

This evaluation kit provides the alternative, portable, solution, e.g. for laptops, and is an excellent choice for gyro module configuration and shorter measurement series.

The kit includes a USB-RS422 converter from Future Technology Devices International which is integrated in one of the communication cable USB connectors.



The USB-RS422 converter cable is a USB to RS422 levels serial UART converter cable, incorporating FTDI's FT232RQ USB to serial UART interface IC device which handles all the USB signalling and protocols. The cable provides a fast, simple way to connect gyro modules with a RS422 interface to USB.

Each USB-RS422 cable contains a small internal electronic circuit board, utilising the FT232R, which is encapsulated into the end of the (communication) cable. The integrated electronics also include the RS422 transceiver plus Tx and Rx LEDs which give a visual indication of data traffic on the cable.

| Feature | Available |
|---|---|
| Portability across PC-s | Yes (custom SW installation required) |
| Hardware installation required? | No |
| Gyro output available? | Yes |
| Acc, Inc & AUX-output | Yes (STIM300 only) |
| TOV, AUX-in, External trigger available? | No |
| Transmission rate supported | Up to 3Mbit/s |

Table 1: **Features of USB kit**

**1.2    Configurable and readable parameters**

Configurable parameters:

- Output format (angular rate, increment angle, etc.)
- Datagram format (standard, extended, etc.)
- Sampling rate
- Bandwidth/ Low pass filter frequency
- RS422 transmission bit rate
- Number of stop bits in datagram
- Parity
- Line/ Datagram termination

Readable parameters:

- Part number
- Serial number
- Firmware revision
- Hardware revision
- Gyro module diagonistics

Detailed diagnostic information includes RAM and flash checks, stack handling checks, status of internal voltage supply references, and various parameter reports for each measurement axis are available from the supported SERVICE mode.

**Note**: Time of Validity (TOV) and external trigger functionalities of STIM300 are not supported by the EVK PC-software.

**2    Kit contents**

- USB to RS422 interface cable with USB power supply connector
- Memory stick with
    - PC software, STIM210 and STIM300
    - FTDI CDM20824 serial driver for Windows and
    - User manual  for evaluation kit
- Allen Wrench for fixing connector of communication and power cable to the gyro module
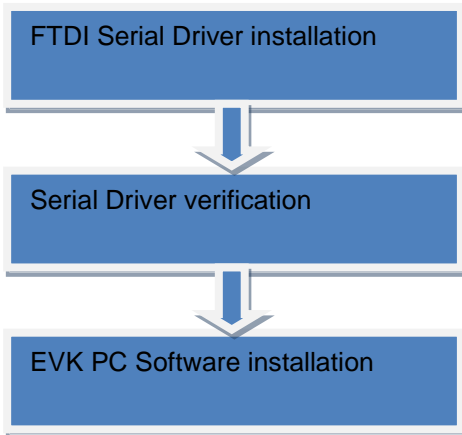- Hard copy of User manual

Note that the evaluation kit does not include a STIM210/STIM300 gyro module. This must be ordered separately.

**3    System requirements**

- Windows XP SP2 (or later), Windows Vista, Windows 7 (32/ 64bit)
- 2 free USB
- Quad core processor recommended (when simultaneously logging data from two gyro modules)

## 4    Getting started

Preparing your system involves the following steps:

```
┌─────────────────────────────────┐
│  FTDI Serial Driver installation │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│  Serial Driver verification     │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│  EVK PC Software installation   │
└─────────────────────────────────┘
```

## 4.1     USB kit Installation of FTDI serial driver

To install the drivers for the FTDI serial driver under Windows, follow the instructions below:

- Connect the USB-RS422 plug to a spare USB port on your PC.
- If there is an available Internet connection, some Windows versions will silently connect to the Windows Update website and install a suitable driver
- In the event that no automatic installation takes place, please refer to the set-up guide from FTDI: http://www.ftdichip.com/Support/Documents/InstallGuides.htm

## 4.2     Verification and configuration of serial driver

Launch *Device Manager*. See *Control Panel -> Hardware and Sound -> Devices and Printers*.

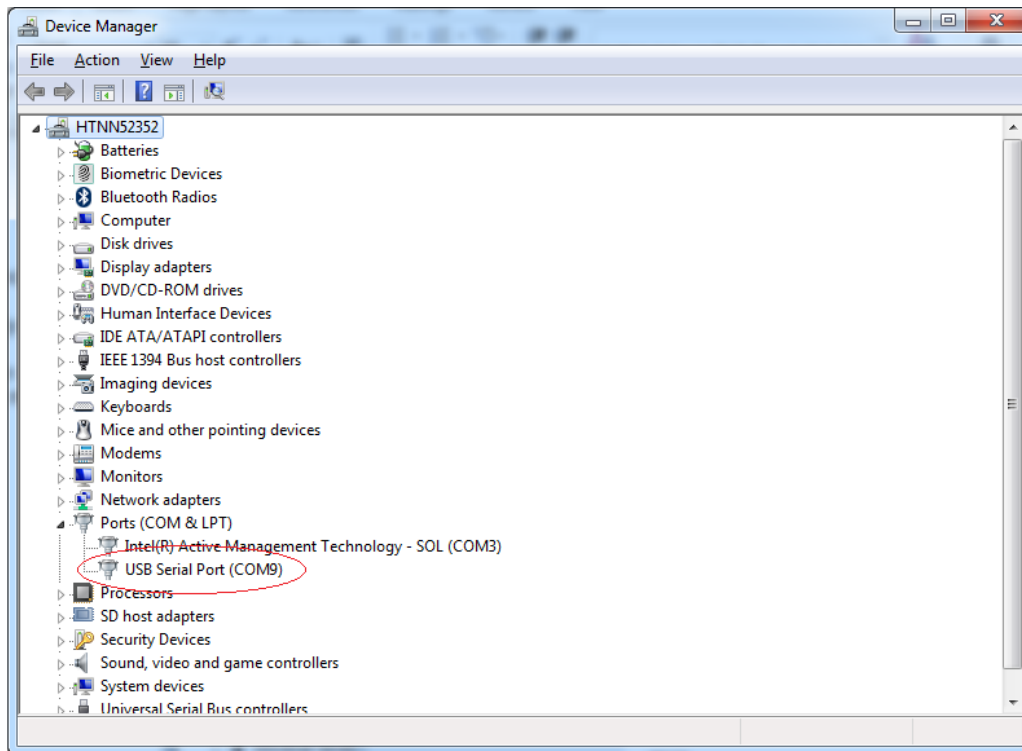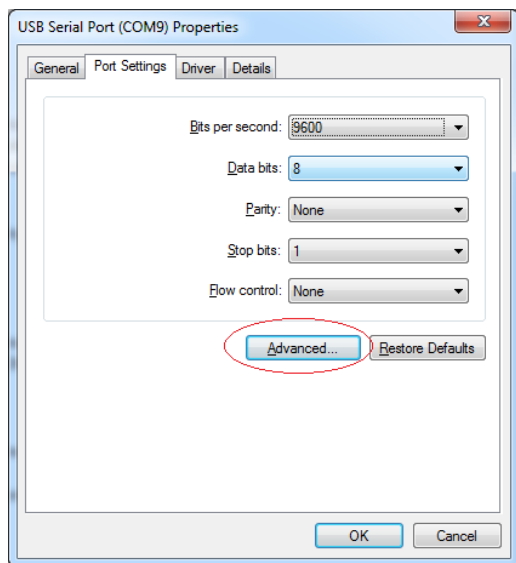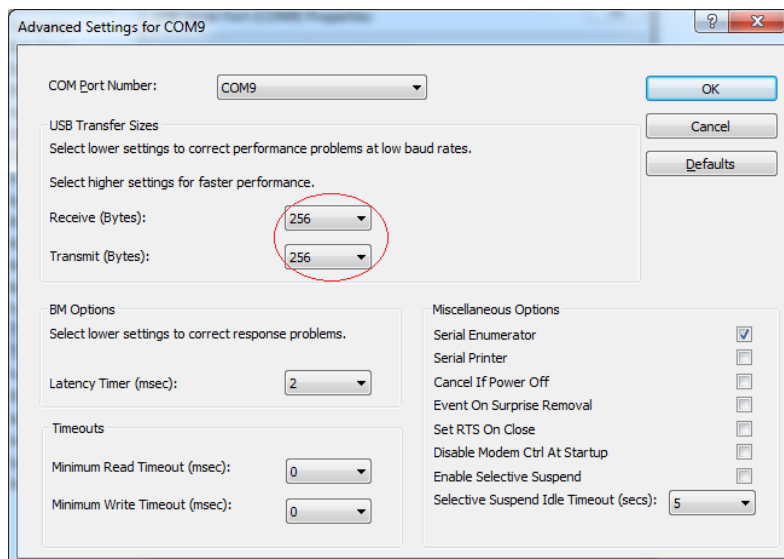Verify that the driver installation has completed successfully:



**Figure 1:** COM port assignments for USB cable in Windows 7

Make a note of the assigned COM port value(s) is information. This will be needed later for connecting to the STIM from the PC software

Right-click "USB Serial Port (COM<n>)" and select "Properties"

Select "Advanced" from the "Port Setting" tab.



Set the "Receive (Bytes)" and Transmit (Bytes) settings to 256.
Press OK twice.


The computer may have to be restarted for the changes to take effect.

## 4.3    Installation of PC software

Install the PC software by running "setup.exe" found on the included memory-stick. Follow the on-screen instructions to complete the installation. See the following figures for guidance.

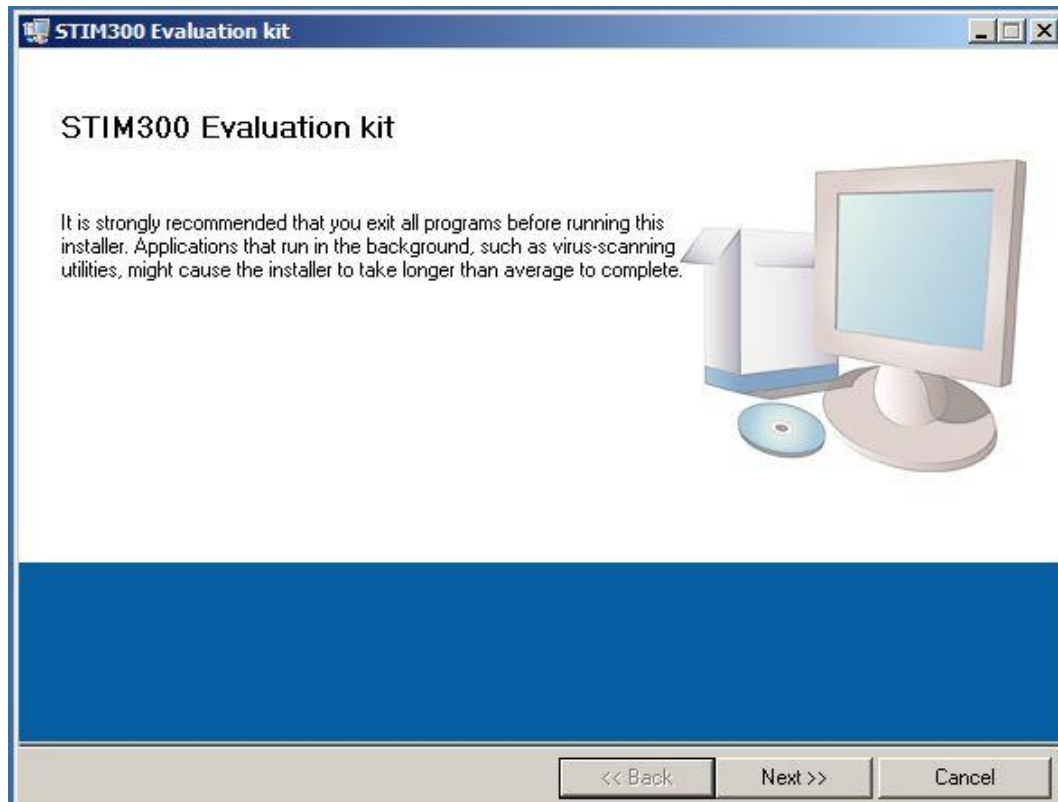The PC software also can be downloaded from the Sensonor support site. Check this site regularly for updates.



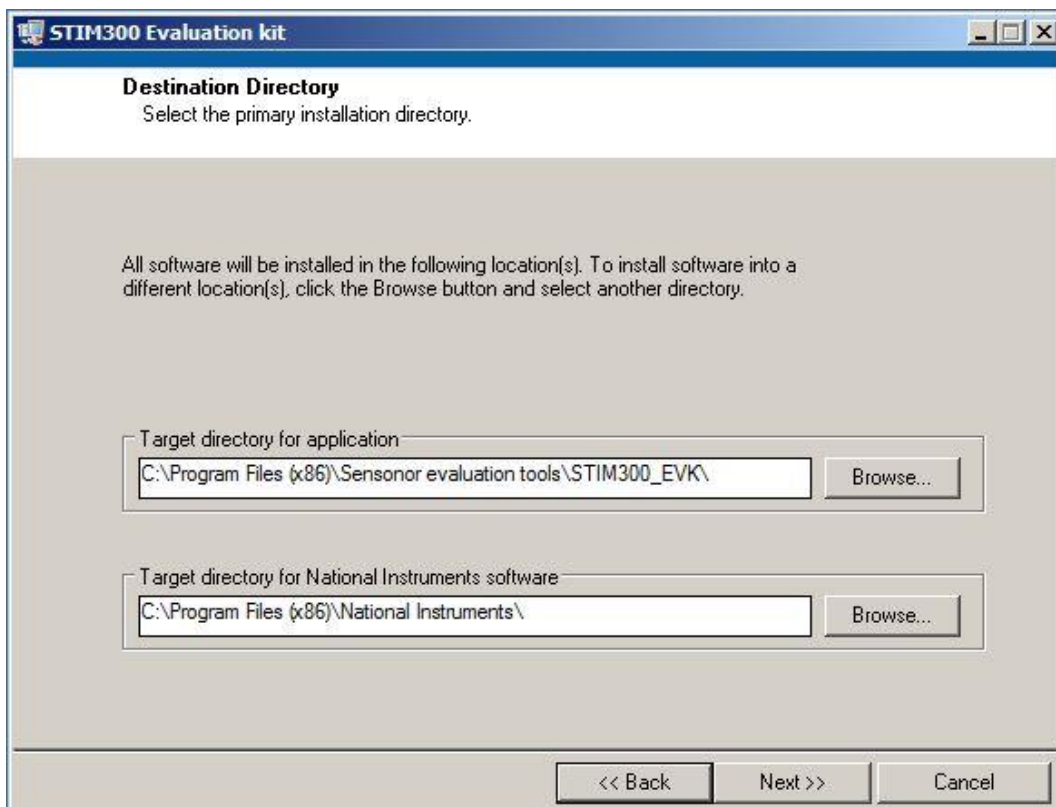**Figure 1:** PC software installation (1 of 6). Installer initializes

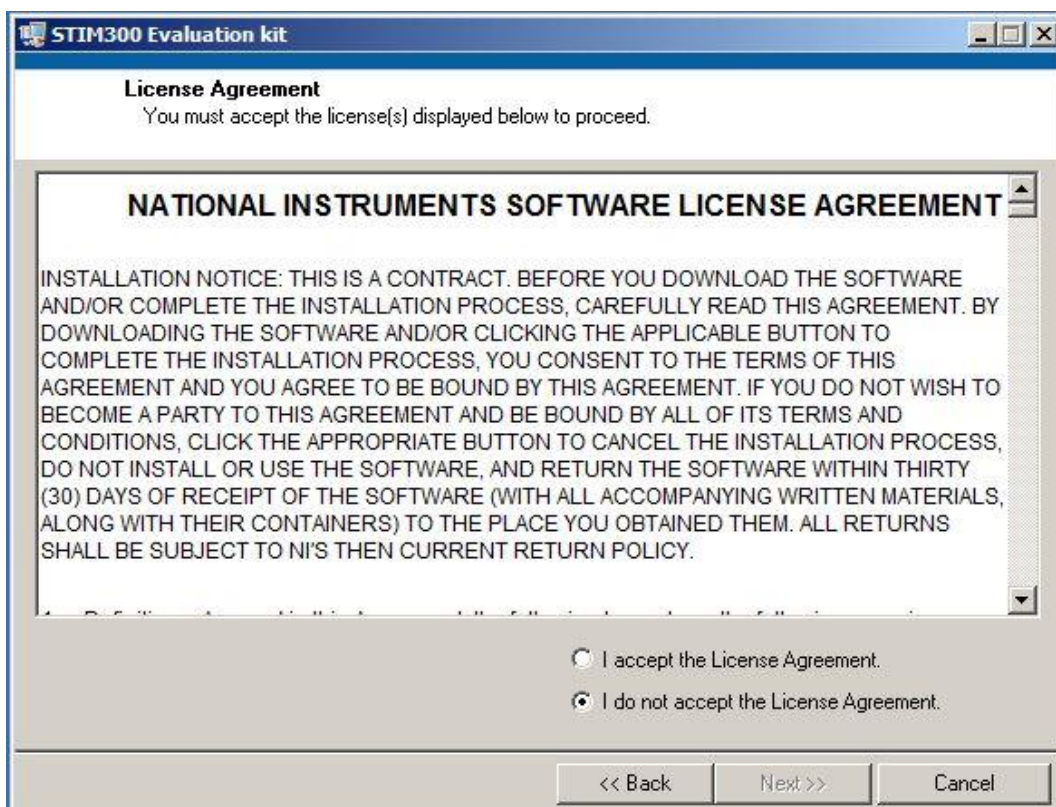**Figure 2:** PC software installation (2 of 6)
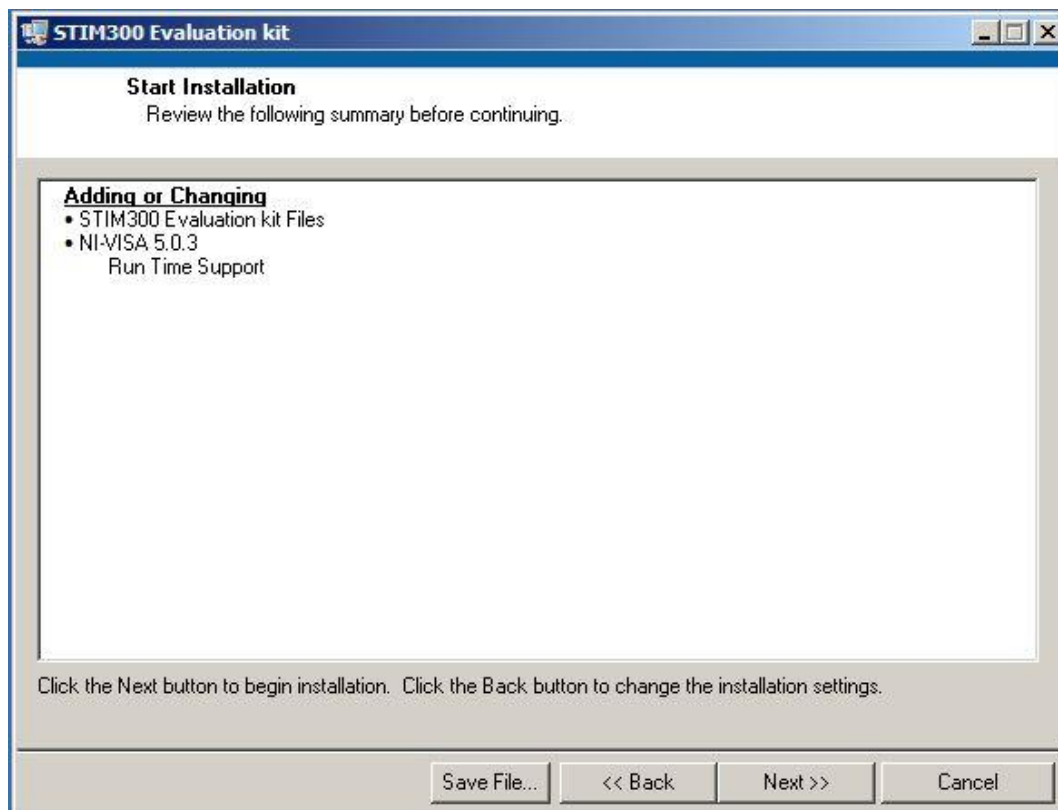


**Figure 3:** PC software installation (3 of 6)

**Figure 4:** PC software installation (4 of 6)



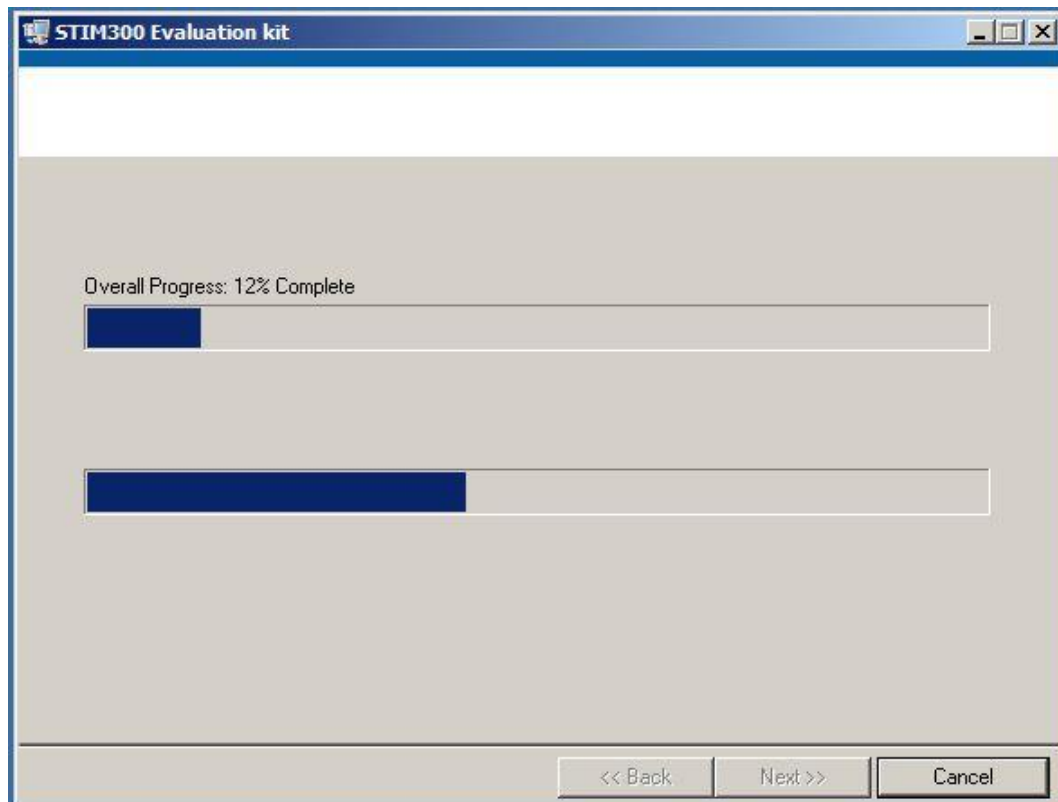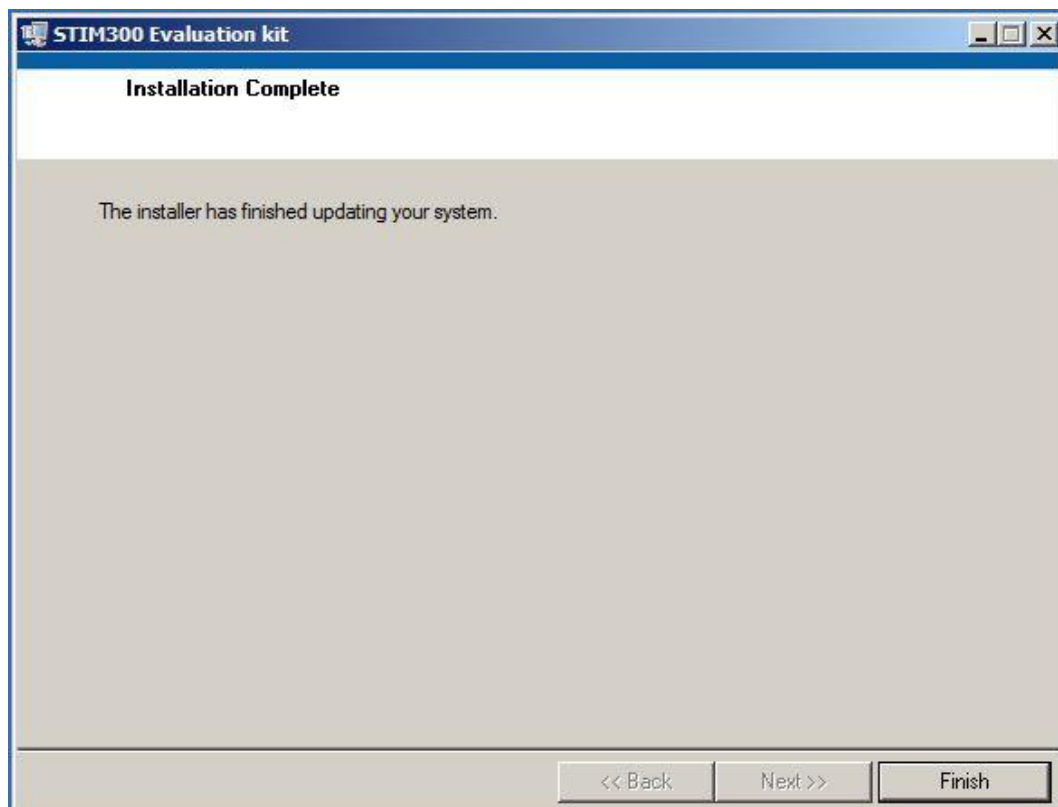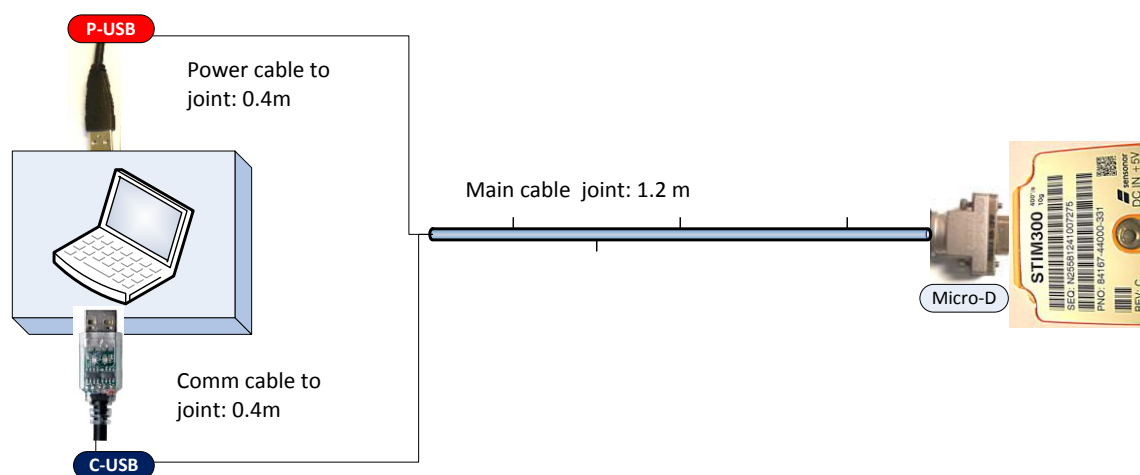**Figure 5:** PC software installation (5 of 6). Installation complete

**Figure 6:** PC software installation (6 of 6). Installation complete

## 5    Connecting the STIM to your PC

### 5.1    USB kit

**6    First PC software start-up**

1. Navigate to the 'Sensonor evaluation tools' folder from Windows start menu. Click on the shortcut named "STIM300 EVK" or "STIM210 EVK" to start the PC software. For full functionality, the computer user should have Local Administrator rights.
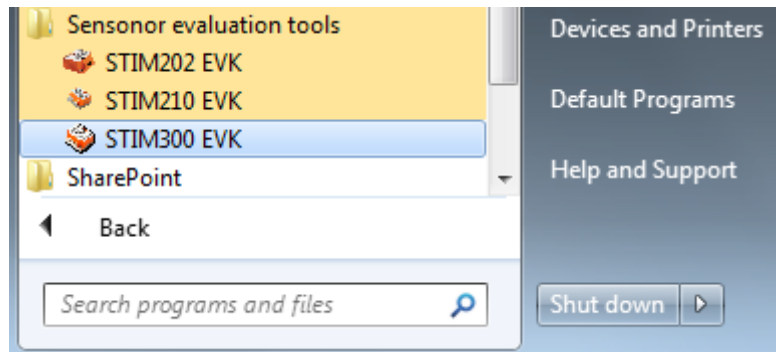


**Figure 7:** Starting PC software from Windows 7 start menu

2. A pop-up box for software registration appears. Fill in the open fields and press "Submit". The default email client opens. Press "Send" in order to complete this step (user information is sent to Sensonor for support issues). This step will only have to be completed once.
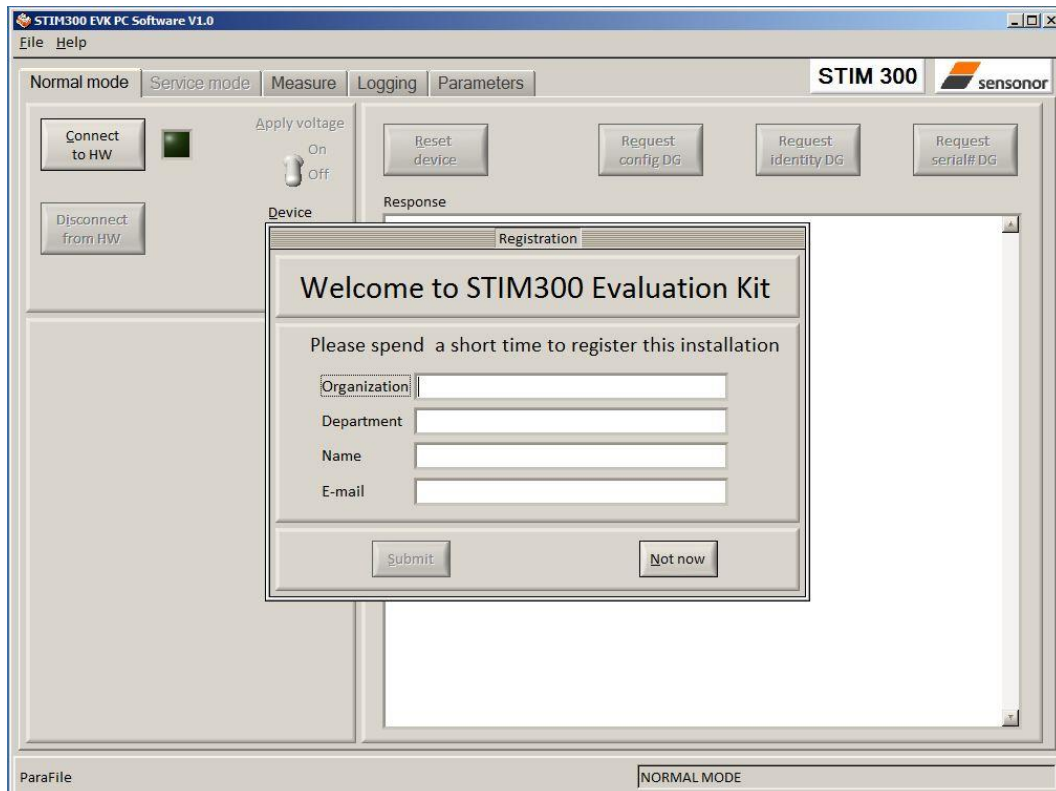


**Figure 8:** Welcome message and software registration

3. A pop-up box appears, asking for a parameter (.INI) file. Select the INI-file (available in the installation folder by default) and press "Load"
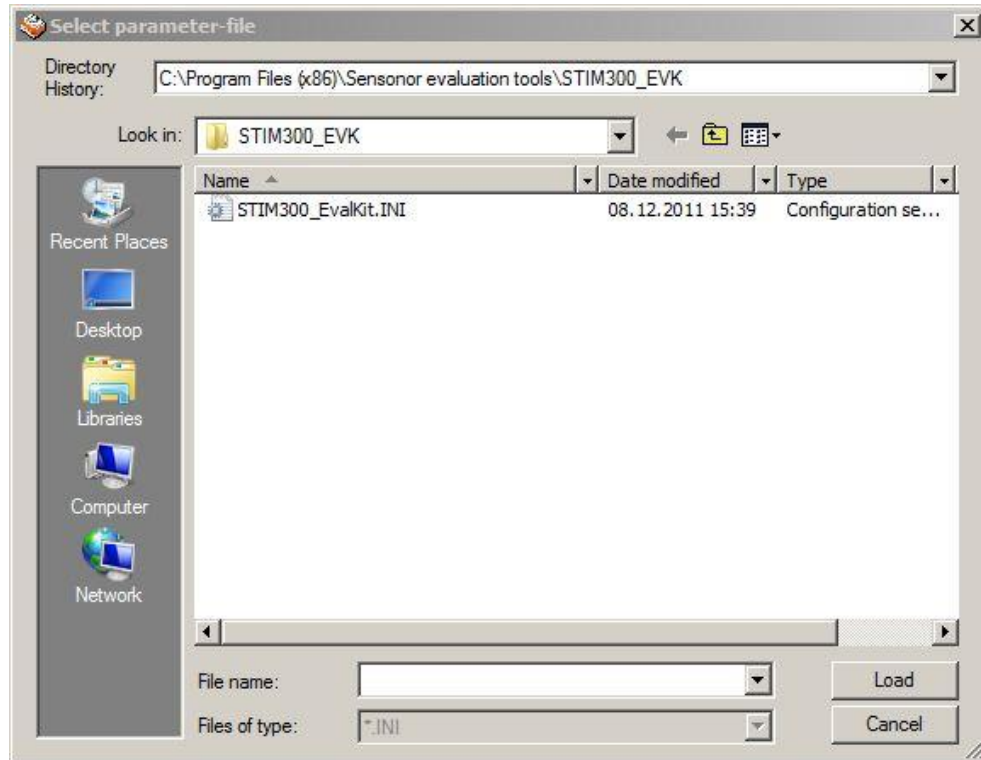


**Figure 9:** INI-file selection

4. The Normal mode panel is shown
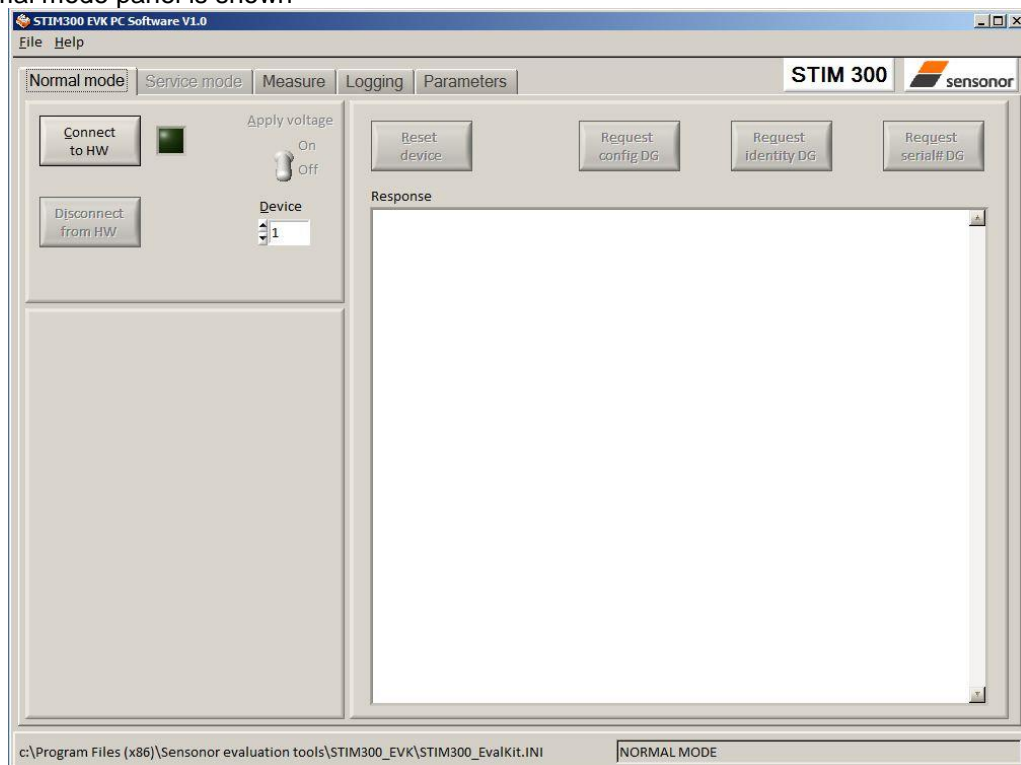


**Figure 10:** Normal mode panel after selecting INI-file

5. Verify the correct COM port settings in the Parameters view. If needed port # setting needs to be changed, do this by double clicking on the value and enter correct value. The default password to edit is 'stim'
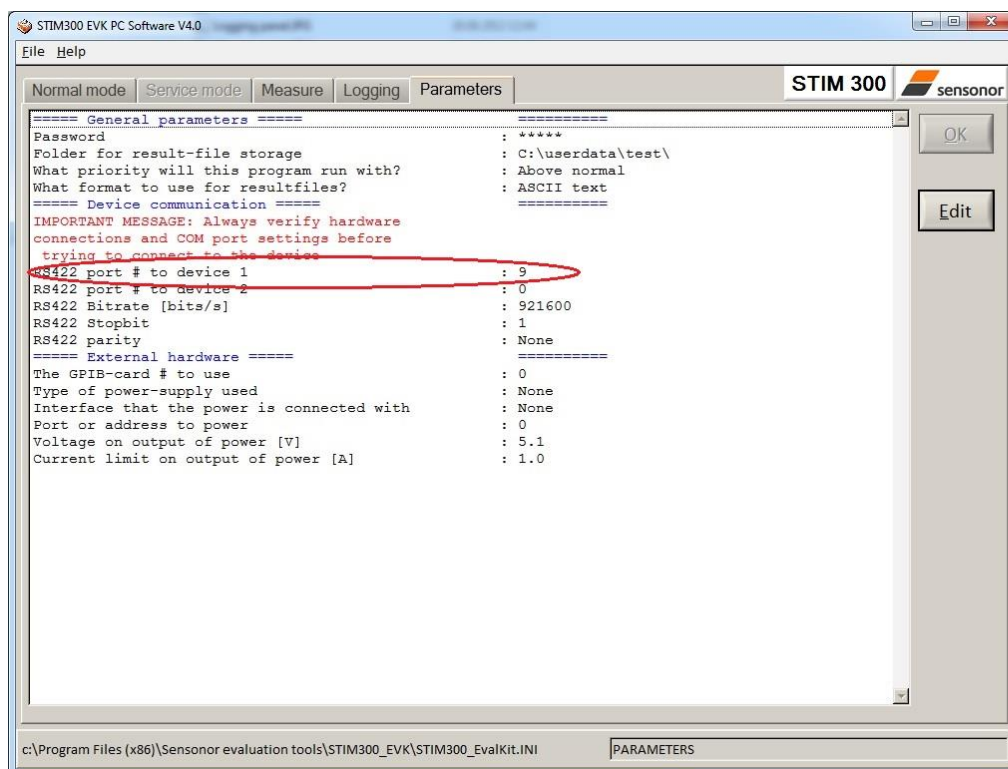


**Figure 11:** Edit the INI-file in order to verify correct COM port settings

6. Set the correct value for RS422 bit rate, according to the configuration of the STIM unit:
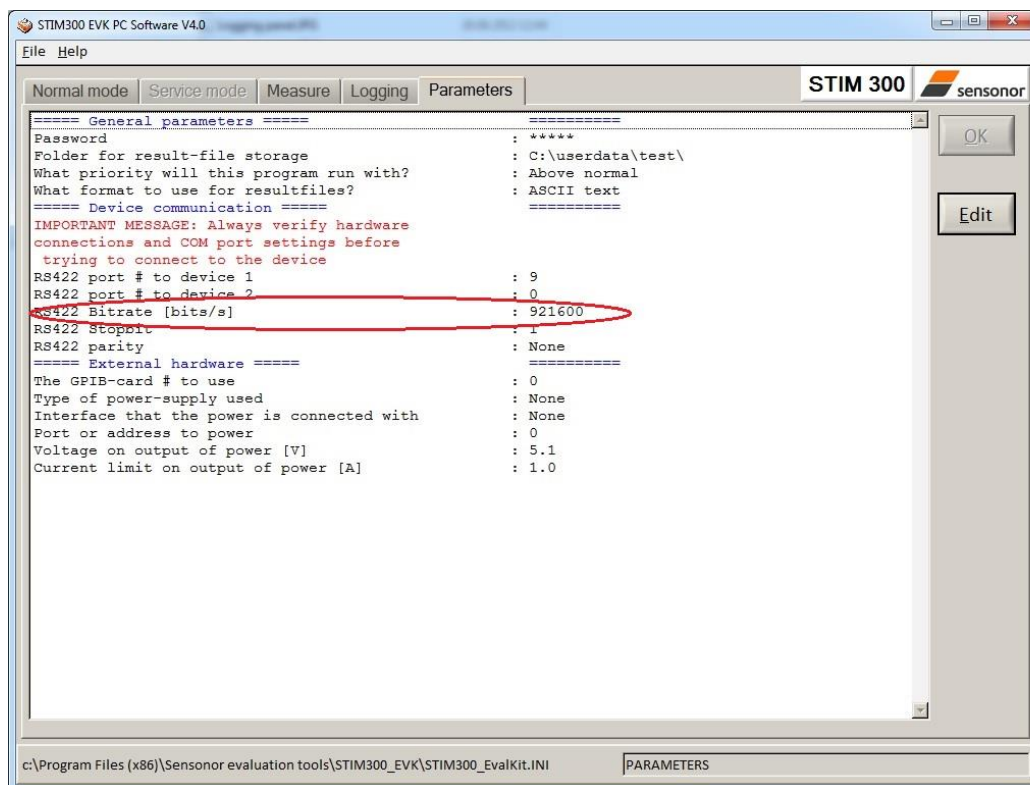


**Figure 12:** Edit parameters, here RS422 bit rate

7. Connect the gyro module by pressing the 'Connect to HW' button in the Normal mode panel. A green LED light indicates that the COM port is active
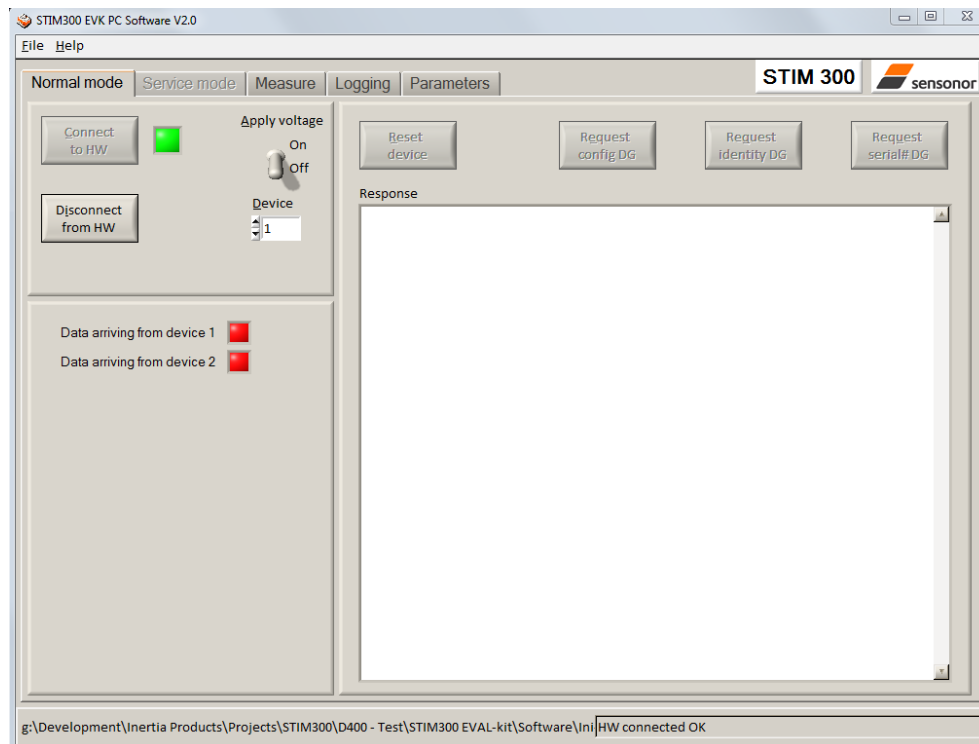


**Figure 13:** Normal mode panel after first hardware connection

8. Press the 'Apply voltage' control switch position to 'On'. The pop-up message telling "Turn on device supply voltage" appears. Insert the red USB connector into a free USB port of the PC/ laptop. Confirm the supply voltage is applied by pressing 'OK' on the pop-up message
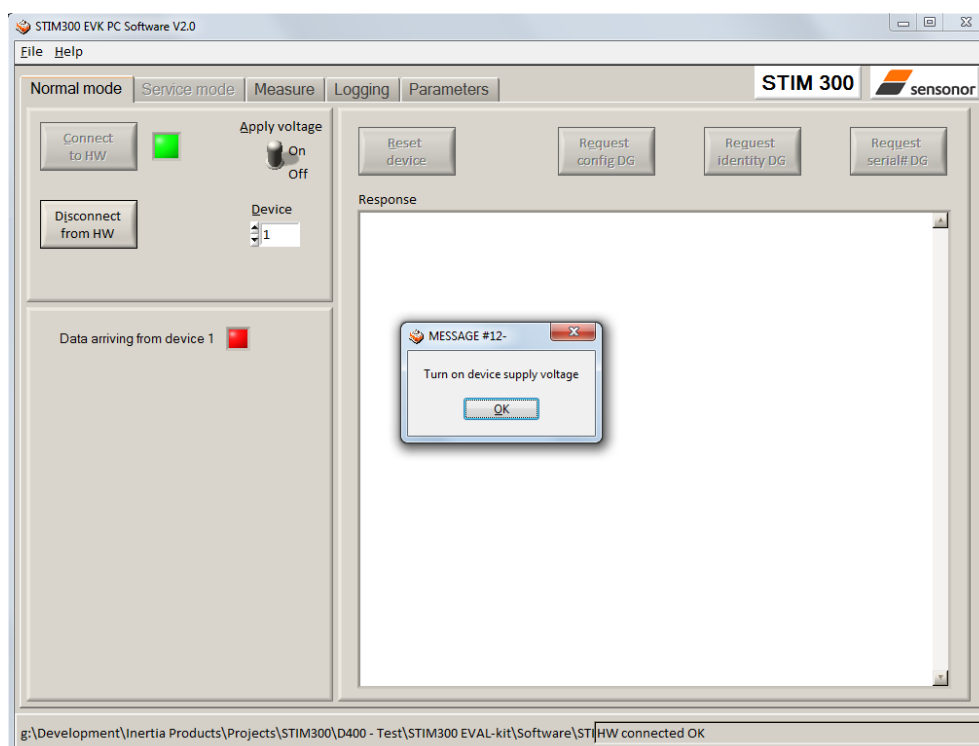
**Figure 14:** Normal mode panel when USB power connector of *STIM300 communication and power cable* is to be inserted

9. A green LED (Data arriving from device n) indicates that data is received from the gyro module(s). Verify the communication to module by clicking on the 'Request config DG' button. An example of such a result is shown in Figure 15. The system is now ready for use.
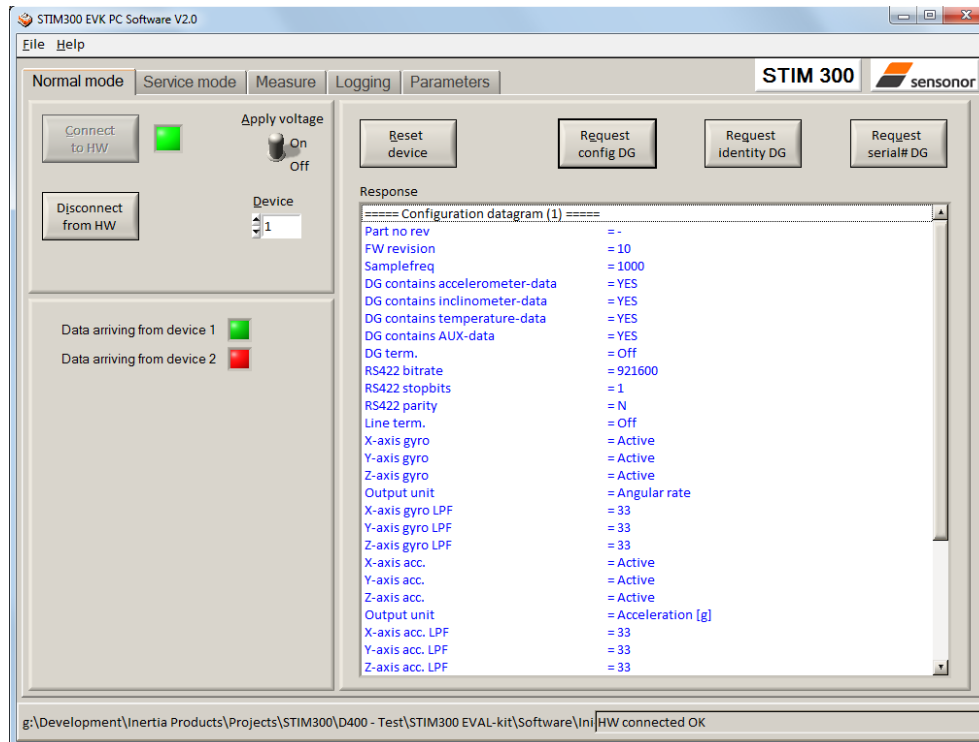


**Figure 15:** Result of sending 'Request config DG' to the IMU

## 7    Introduction to PC software

### 7.1    Panels overview
In addition to the panel already shown (Normal mode and Parameters panel), other panels are also available:

### 7.1.1    Service mode panel
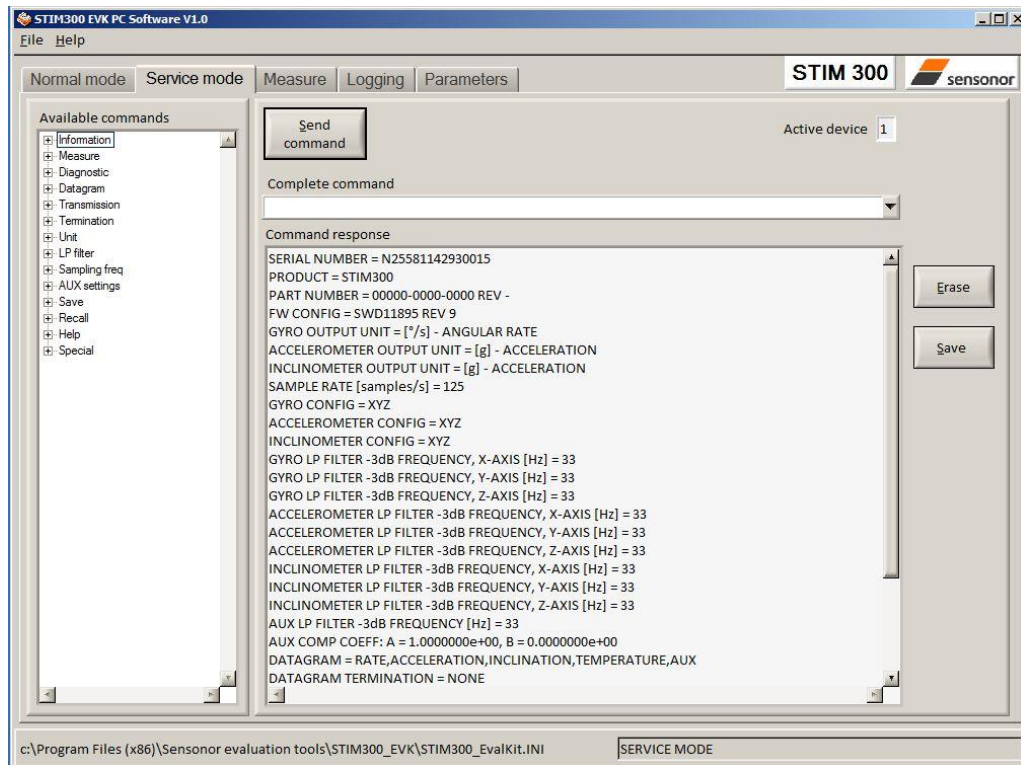


**Figure 16:** Service mode panel

### 7.1.2    Measure panel
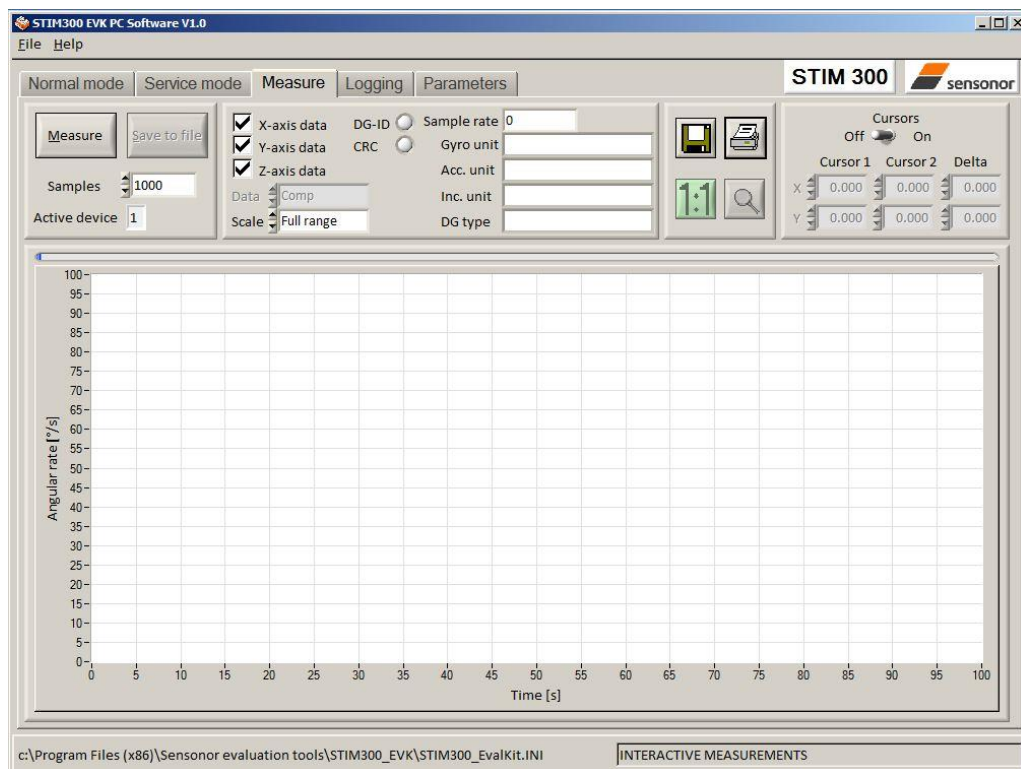
**Figure 17:** Measure panel

### 7.1.3    Logging panel
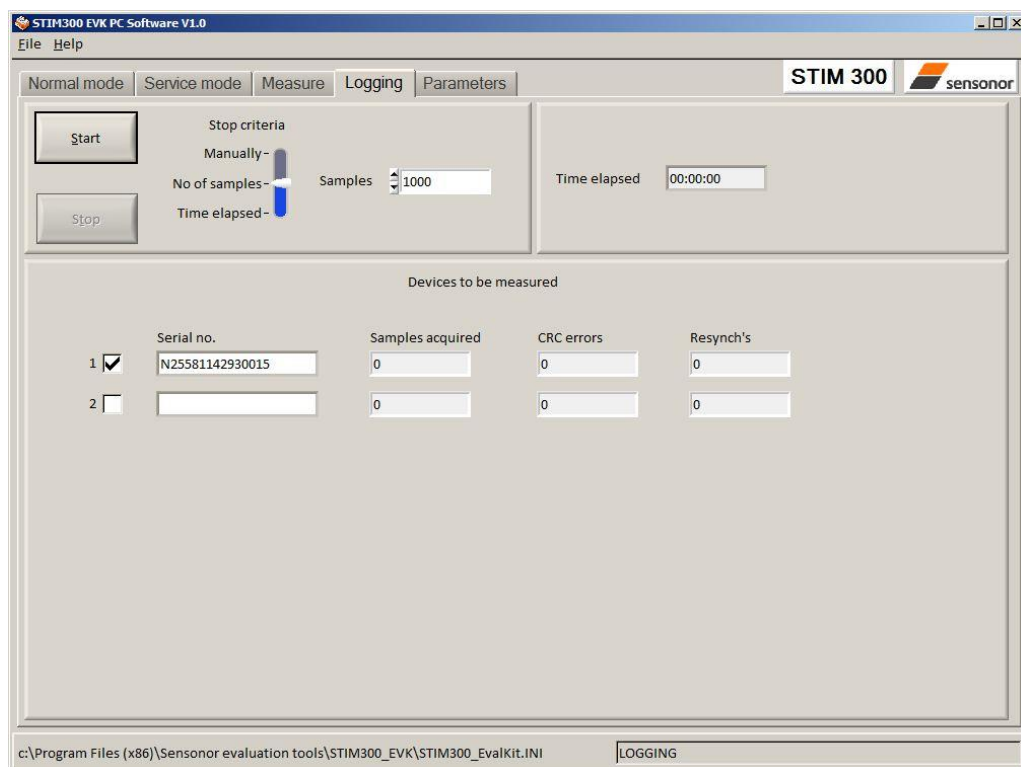

**Figure 18:** Logging panel (for saving data to file)

## 7.2    Main panel menu

| Menu | Description |
|------|-------------|
|      |             |

| | |
|---|---|
| *'File' → 'New parameter file'* | Creates a new INI-file with default settings. Note that the new INI-file must be edited to match the hardware and gyro module configuration settings. |
| *'File' → 'Open parameter file'* | For loading an existing INI-file |
| *'File' → 'Save parameter file as'* | To save current parameter settings with a new file name |
| *'File' → 'Print parameters'* | For printing the current 'Parameters' content on the default printer |
| *'File' → 'Edit parameters'* | Edit the 'Parameters' content |
| *'File' → 'Exit'* | Exit program |
| *'Help' → 'Check for updates'* | Opens the Sensonor support site in a web browser. New and updated Drivers, PC software and user manuals can be downloaded |
| *'Help' → 'About'* | Information about the program (Program name, publisher and software revision number) |



**Figure 19:** File Menu



**Figure 20:** Help menu

## 7.3    Normal mode panel descriptions

**Table 2:** Normal mode panel descriptions

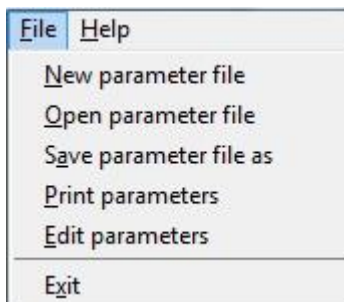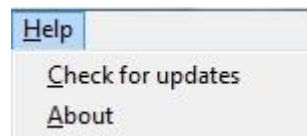| Panel unit | Functionality and description |
|---|---|
| Connect to HW | Connects to interface hardware. Opens COM port according to settings specified in active parameter file |
| LED | Indicator for hardware connection. A GREEN light indicates the COM port is opened |
| Disconnect from HW | Disconnects from interface hardware. Closes the COM port |
| Apply voltage switch (On/Off) | Toggles supply voltage if connected to an external power supply. Controls certain functions of the PC software. |
| Device box | Device number (and corresponding COM port) according to active parameter file. Selects which gyro module is activated for datagram requests in Normal mode, Service mode operations and measurements in Measure panel. Does not apply for Logging panel. |
| Reset device button | Resets the gyro module. Sends reset command ('R') |
| Request config DG button | Sends command ('C') to receive configuration datagram |
| Request identity DG button | Sends command ('N') to receive part number datagram |
| Request serial# DG button | Sends command ('I') to receive serial number datagram |
| Response window | Displays response to special datagram requests ('C', 'N' and 'I' datagrams) |

## 7.4    Service mode panel descriptions

Service mode is used for gyro module configuration.

Service mode is entered by clicking on the Service mode tab next to the Normal mode tab after the gyro module has been powered up. Service mode usage, functionalities and descriptions are listed in Table 3. Exit from Service mode to Normal mode by selecting one of the other panel tabs (Normal, Logging, Service or Parameter panel tab).

Note: Changes made for the gyro module in Service mode are only stored permanently in flash memory when the save command ('s') subsequently is sent to the gyro module.

| Panel unit | Functionality and description |
|---|---|
| Available commands window | Shows a list of available commands. See product datasheet for details |
| Complete command window | Contains the complete command to be sent. The command is auto-completed by the software during usage of the listings in the Available commands window. Left click inside the Complete command window brings up a list of previously sent commands. Right click enables manual command entry |
| Send command button | Sends command to the gyro module |
| Active device indicator | Indicates active gyro module. Corresponding COM port is specified in the active parameter file |
| Command response window | Shows the responses to commands from the gyro module. See product datasheet for details |
| Erase button | Clears the content of the command response window |
| Save button | Saves the content of the command response window to a text file with a date and time tag |

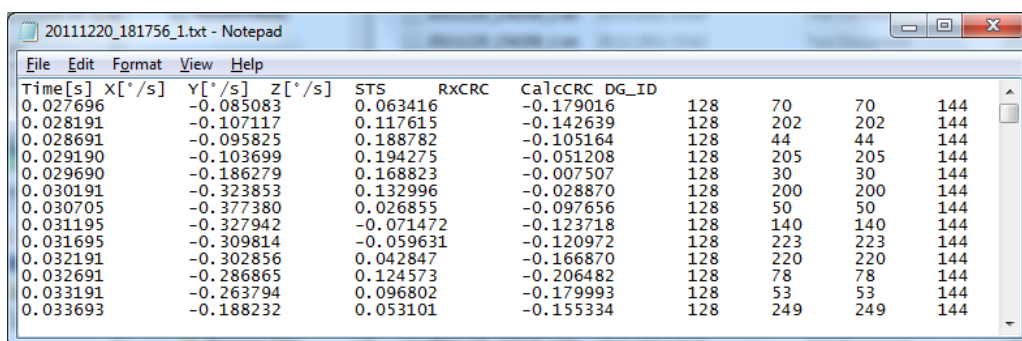Table 3: **Service mode panel descriptions**

**7.5    Measure panel descriptions**

| Panel unit | Functionality and description |
|---|---|
| Measure button | Starts a measurement series |
| Samples box | Defines the number of samples to be collected (max 50 MS) |
| Save to file button | Saves data from a completed measurement series to a result file. The file path defined in the active parameter file is proposed |
| X-, Y- and Z-axis check boxes | Selects which axis data to present in the graph area (up to 3 axes can be plotted simultaneously) |
| Active device indicator | Indicates active gyro module. Corresponding COM port is specified in the active parameter file |
| CRC and DG-ID LEDS | Status on all CRC checks and DG-IDs. GREEN = OK, RED = FAIL |
| Data box | Selects which datagram content to be shown. Several options are available, depending on the active datagram type. Left click inside box to display available selections. The plot updates immediately if a measurement series has been done. |
| Scale box | Enables user to change Y-axis scaling (Full range, User defined, or Auto). Left click inside box to display available selections |
| Sample rate box | Displays the sample rate used in measurement |
| Unit box | Displays the output unit for all measurements (Angular Rate, Incremental Angle, etc.) |
| DG type box | Displays the type of datagram received |
| Save to disk icon | Saves the plot to a .JPG file |
| Print icon | Prints a picture of the plot to the default printer |
| 1:1 icon | Resets zoom level to 1:1 (if ZOOM is active. See below) |
| Zoom icon | Enables a custom zoom of the presented results in the strip chart (graph area) according to placement of the cursors |
| Cursors (On/Off) switch | Enables usage of cursors (default is Off) |
| Cursor 1 | Shows the location of cursor no 1 |
| Cursor 2 | Shows the location of cursor no 1 |
| Delta | Shows the delta between the two cursor locations (X and Y values) |
| Progress bar | A blue continuous line above plot area shows the measurement series progress |
| Lower bar on panel | Shows the INI-file in use and the active mode (INTERACTIVE MEASUREMENTS) |

Table 4: **Measure panel descriptions**

Saved data:
An example of a result file is shown in Figure 21, for a standard datagram measurement series of gyro module # 1. A description of each of the columns of the data log file is found in the table that follows.



**Figure 21: Result file example**

**Table 5: Result file example. (Standard datagram content written to file)**

| DG-type | Col. # | Heading | STIM210 | STIM300 | Comments |
|---|---|---|---|---|---|
| Standard | 1 | Time[s] | X | X | Time in seconds (derived from sample rate). First sample is always zero. |
| | 2 | GYRO_X | X | X | Gyro signal X-axis |
| | 3 | GYRO_Y | X | X | Gyro signal Y-axis |
| | 4 | GYRO_Z | X | X | Gyro signal Z-axis |
| | 5 | GYRO_STS | X | X | Status-byte for gyro |
| | 6 | GYRO_TMP_X | X | X | Temperature, X-axis gyro |
| | 7 | GYRO_TMP_Y | X | X | Temperature, Y-axis gyro |
| | 8 | GYRO_TMP_Z | X | X | Temperature, Z-axis gyro |
| | 9 | GYRO_TMP_STS | | X | Gyro temperature status |
| | 10 | ACC_X | | X | Accelerometer signal X-axis |
| | 11 | ACC_Y | | X | Accelerometer signal Y-axis |
| | 12 | ACC_Z | | X | Accelerometer signal Z-axis |
| | 13 | ACC_STS | | X | Status-byte for accelerometer |
| | 14 | ACC_TMP_X | | X | Temperature, X-axis accelerometer |
| | 15 | ACC_TMP_Y | | X | Temperature, Y-axis accelerometer |
| | 16 | ACC_TMP_Z | | X | Temperature, Z-axis accelerometer |
| | 17 | ACC_TMP_STS | | X | Accelerometer temperature status |
| | 18 | INC_X | | X | Inclinometer signal X-axis |
| | 19 | INC_Y | | X | Inclinometer signal Y-axis |
| | 20 | INC_Z | | X | Inclinometer signal Z-axis |
| | 21 | INC_STS | | X | Status-byte for Inclinometer |
| | 22 | INC_TMP_X | | X | Temperature, X-axis inclinometer |
| | 23 | INC_TMP_Y | | X | Temperature, Y-axis inclinometer |
| | 24 | INC_TMP_Z | | X | Temperature, Z-axis inclinometer |
| | 25 | INC_TMP_STS | | X | Inclinometer temperature status |
| | 26 | AUX | | X | Auxiliary input measurement |
| | 27 | AUX_STS | | X | Auxiliary status |
| | 28 | Counter | X | X | Sample counter. See product datasheet for details |
| | 29 | Latency | X | X | Sample latency. See product datasheet for details |
| | 30 | RxCRC | X | X | Received CRC |
| | 31 | CalCRC | X | X | Calculated CRC |
| | 32 | DG_ID | X | X | Datagram identifier |

## 7.6 Logging panel

**Table 6:** Logging panel descriptions

| Panel unit | Functionality and description |
|---|---|
| Start button | Starts data logging |
| Stop button | Stops data logging |
| Stop criteria slide | User can select between "Manually", "No of samples" and "Time elapsed" for stopping a measurement series |
| Samples box | Used for defining number of samples when logging a finite number of samples |
| Time elapsed | Shows the time elapsed since start of test |
| Samples acq. | Shows number of samples acquired |
| CRC_errors | Shows number of CRC errors (normally 0, otherwise the user should consider to reject results data in any analysis) |
| Resynch's | Increments from 0 to a number if any re-synchronisations are needed in order to re-establish data collections from module |

Log to file capability:

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- Quad core processor is recommended when measuring on two gyro modules simultaneously
- The size of the log file is only limited by the available space on the storage media in use
- The path for result file storage is defined in the active parameter file
- The program should be run with administrator rights to ensure the creation and storage of the result file

## 7.7 Parameters panel

**Table 7:** Parameters panel descriptions

| Panel unit | Functionality and description |
|---|---|
| ===== General parameters ===== | |
| Password | Current valid password to be able to edit the parameters list. The password is "stim" |
| Folder for result-file storage | Path to storage (e.g. "c:\userdata\test\") |
| What priority will this program run with | Instructs the program priority for the PC operation system |
| What format to use for result files | ASCII text by default. Can be changed to 8 byte binary |
| ===== Device communication =====<br>IMPORTANT MESSAGE: Always verify hardware connections and COM port settings before trying to connect to the device | |
| RS422 port # to device 1 | Defining which COM port # to assigned to gyro module # 1 |
| RS422 port # to device 2 | Defining which COM port # to assigned to gyro module # 2 |
| RS422 Bitrate [bit/s] | RS422 bit rate selection |
| RS422 Stopbit | 1 or 2. Default is "1" |
| RS422 parity | None, odd or even. Default is "None" |
| ===== External Hardware ===== | |
| The GPIB-card # to use | Interface for external power supply (optional). If card(s) are in use; the first card will be assigned to #0, second to #1, etc. Default value is "0" |
| Type of power supply used | External power supply (optional). Default "None" (not in use). Agilent E3631A, E3633A and E3644A are supported |
| Interface that the power is connected with | Interface type for external power supply (optional). Default "None" (not in use). RS232 (for Agilent E3631A only) and GPIB supported |
| Port or address to power | GPIB port for external power supply (optional). Default "0" (not in use). Selectable up to 31 |
| Voltage on output of power supply [V] | Voltage output on external power supply (optional). Default value is 5.1 V. Value should be within the supply voltage range of the gyro module. See product datasheet for details |
| Current limit on output of power [A] | Current limitation on external power supply (optional). Default value is 1.0 A |

## 7.8 Messages from the program

Messages that the program can display are listed in Table 8:

**Table 8:** Possible messages given by the program

| # | Message | Description |
|---|---------|-------------|
| 1 | This application is already running! Stop loading of 2. instance... | The program is already started, a second instance will not be allowed |
| 2 | Wrong password entered! | The password entered does not match the required one for this INI-file |
| 3 | No response to message was received | Did not receive the expected response to the sent service-mode command |
| 4 | There is no measurement data available for storage | To be able to save measurement data, there must be data available |
| 5 | Unable to open the selected file | Saving of measurement data failed, unable to open or create the selected file |
| 6 | Unable to allocate the required memory | Failed to acquire the requested number of datagrams from the gyro module due to error when trying to allocate memory for temporary storage |
| 7 | No product identification datagram received | Even after retries the, expected datagram is not received as response to command sent |
| 8 | No configuration datagram received | Even after retries the, expected datagram is not received as response to command sent |
| 9 | No serial number datagram received | Even after reties the, expected datagram is not received as response to command sent |
| 10 | No datagrams received | Failed to acquire the requested number of datagrams from the gyro module, no recognizable datagrams received |
| 11 | Turn off device supply voltage | Instruction to user when running without controlled power-supply |
| 12 | Turn on device supply voltage | Instruction to user when running without controlled power-supply |
| 13 | Error encountered when trying to control voltage | Failed to control the specified power-supply |
| 14 | Unexpected DG-ID received ! | When waiting for datagrams, unexpected datagrams are received |
| 15 | Unable to read config DG to determine output unit ! | Unable to read configuration datagram to determine the output unit |
| 16 | Unable to synch with DG-stream ! | Failed to acquire the requested number of datagrams from the gyro module, unable to get in synch with datagram stream |
| 17 | Error encountered when trying to print, check configuration ! | Failed to print the graph, check that a printer is configured |
| 18 | Unable to create result-folder specified by parameter ! | The specified pathname cannot be created, either due to access-rights or errors in the path specification |
| 19 | Unable to enter service-mode ! | Unable to enter service-mode, does not receive expected response to command. |
| 20 | Unable to save parameters to active INI-file ! | Error encountered when trying to save parameters onto INI-file |
| 21 | Edit-mode of parameters is active, unable to exit ! | The edit-mode of parameters are active, unable to exit the program until edit mode is ended |
| 22 | You are about to change the RS422 bit rate. If are you using the USB kit hardware provided by Sensonor, please notice that you will not be able to communicate with the device if you change to something else than supported 460800 b/s! For the PCI card there are no worries - it supports all available bit rates | A warning to the user about limitations for certain RS422 hardware |
| 23 | Unable to create/save to selected file, check access rights to folder | Unable to open or create the specified file in the selected folder, try another filename and/or location. The reason may be lacking access rights to the folder, or illegal filename format |
| 24 | Unsupported datagram received | When trying to read datagrams into memory a datagram type not supported by the EVK is detected |